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**E04B 7/02**

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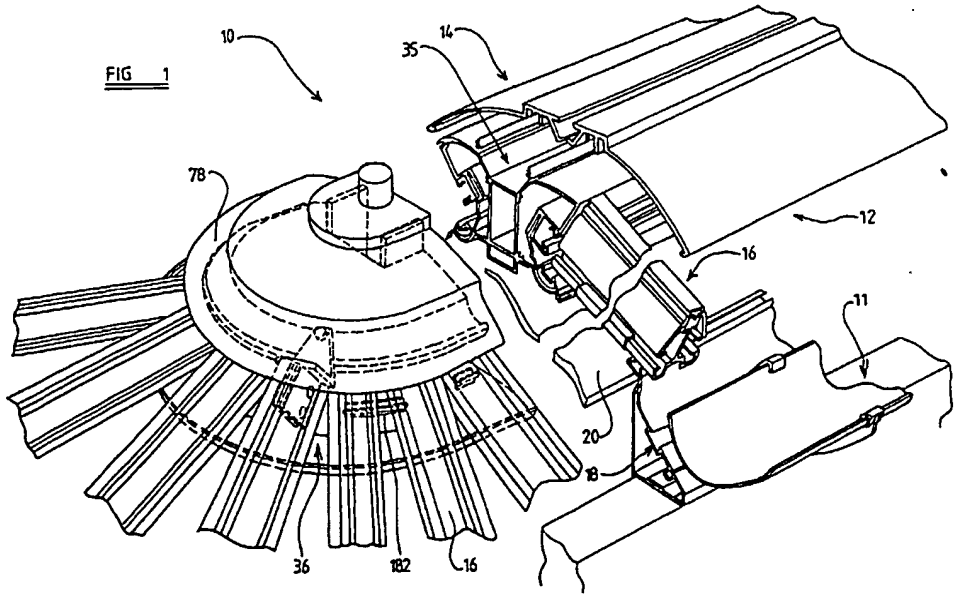
(54) Abstract Title
**Method of assembling a building construction such as a conservatory**

(57) A method of assembling a construction having a wall (11), a roof (12) mounted on the wall, including a ridge assembly (14) with rafters (16) extending towards the wall and an eaves member secured to the wall, characterised in that the rafters are secured to the eaves member and/or ridge assembly by operating a fastening means from below the rafters only. Preferably the head (88a, Figure 6a) of a bolt is held captive in a channel in the rafter and a nut (88b, Figure 6a) is screwed onto the bolt from below the rafter. The rafters may be secured to a radius end member of the ridge assembly by means of connectors where the head (56, Figure 4a) of a bolt is held captive in an aperture (55, Figure 4a) in the connector (50, Figure 4a) and a nut (57, Figure 4a) is screwed onto the bolt from below the rafter. A number of other preferred features are also disclosed. A rafter having an upper or lower capping member is also claimed (Figure 2). A number of other methods of assembling a building construction are also disclosed.

FIG 1

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

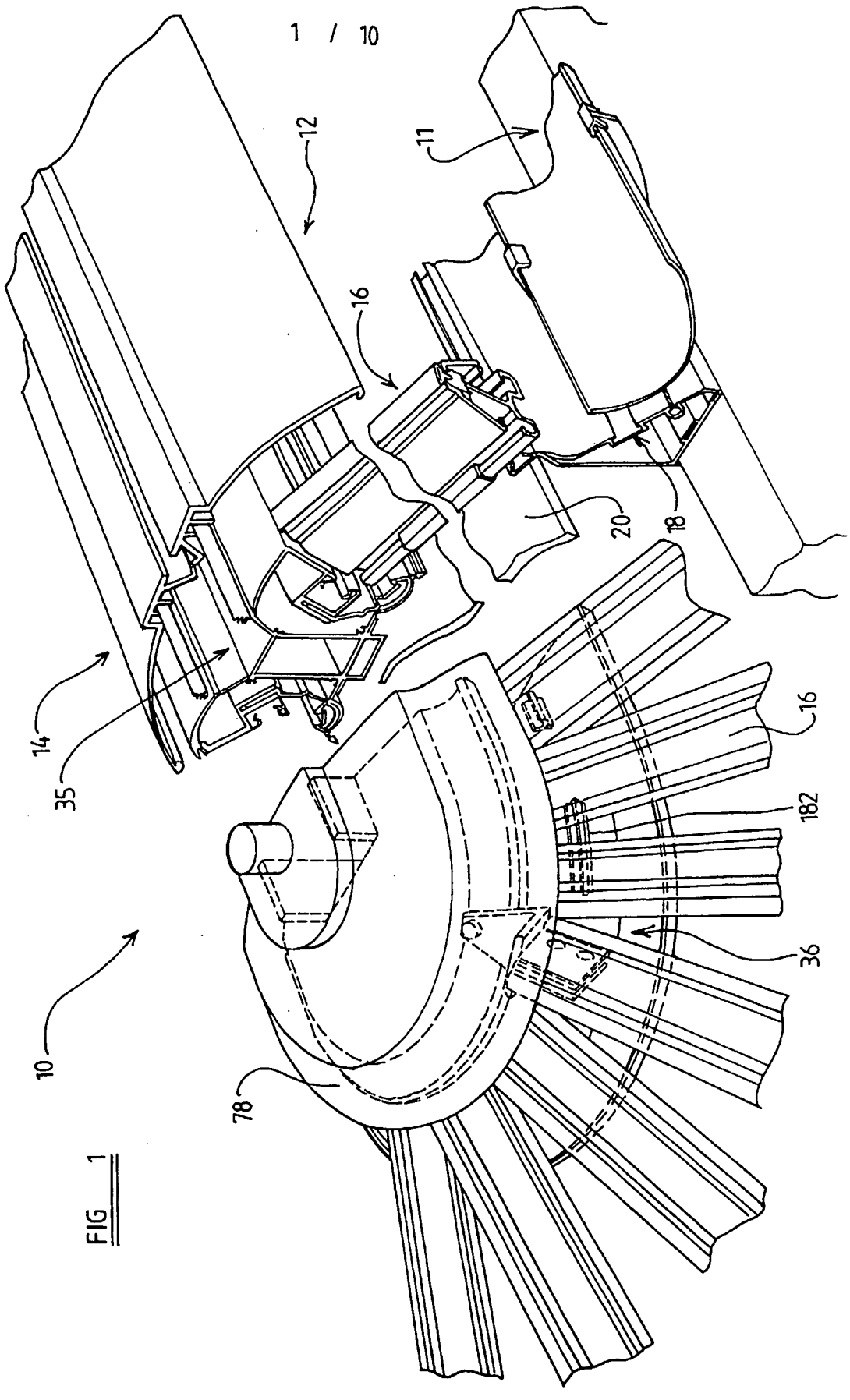
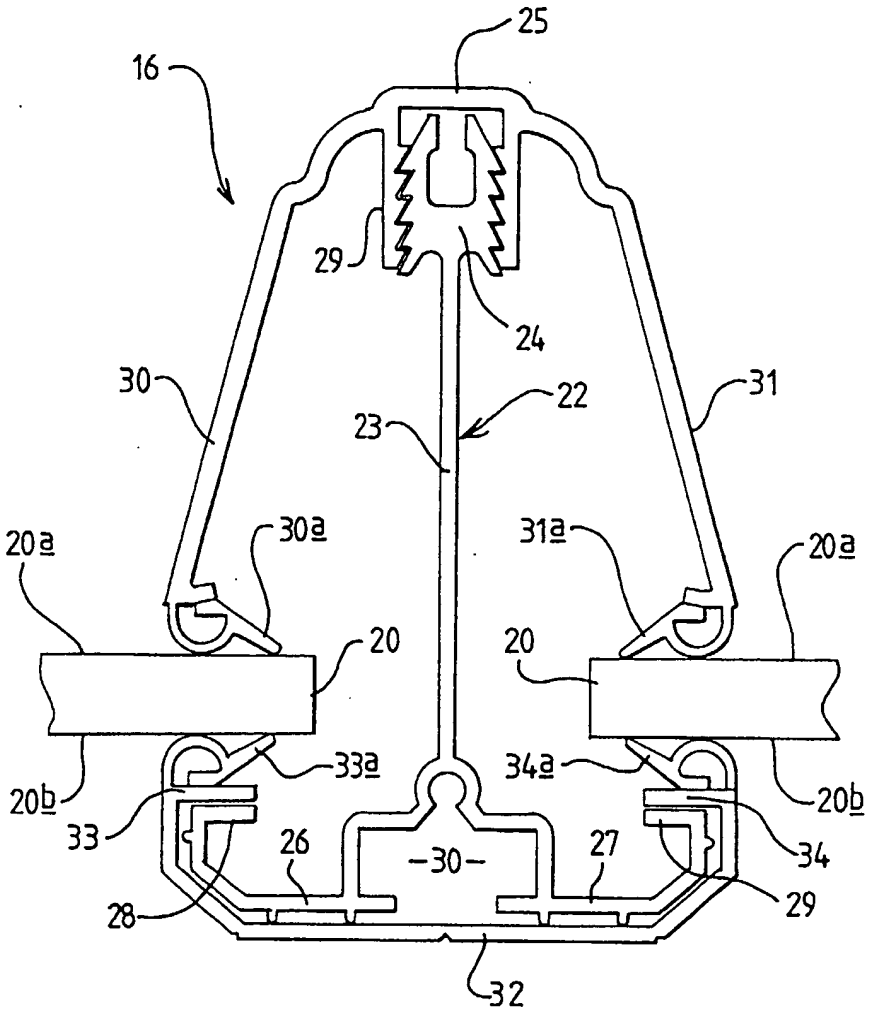



FIG 1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16
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20a
30a
31a
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20b
33a
34a
20b
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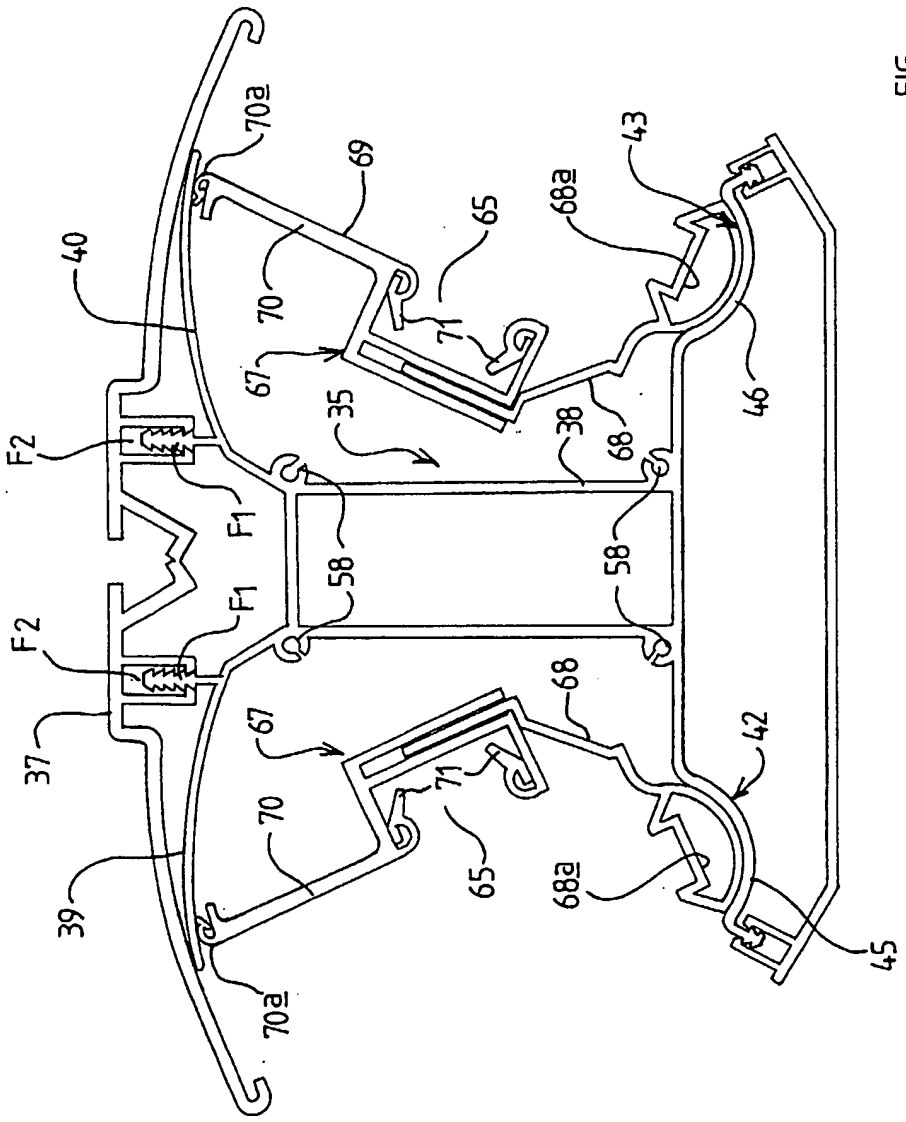
32

FIG 2


70a
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43
40
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68a
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38
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F2
F1
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F2
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71
70
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68a
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70a

FIG 3

FIG 4a

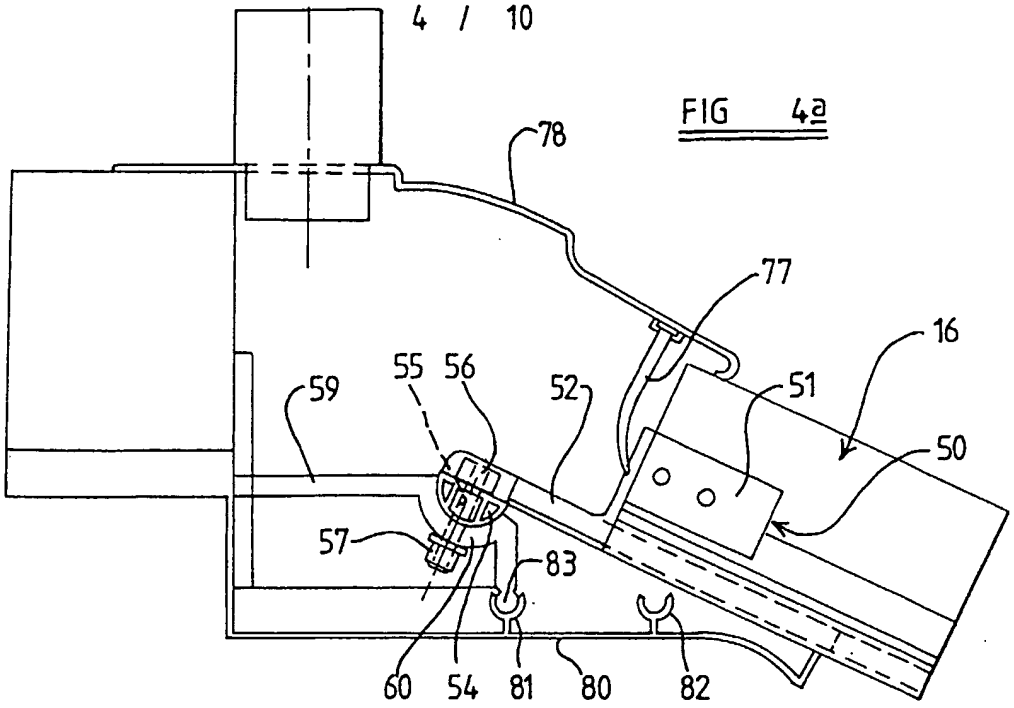
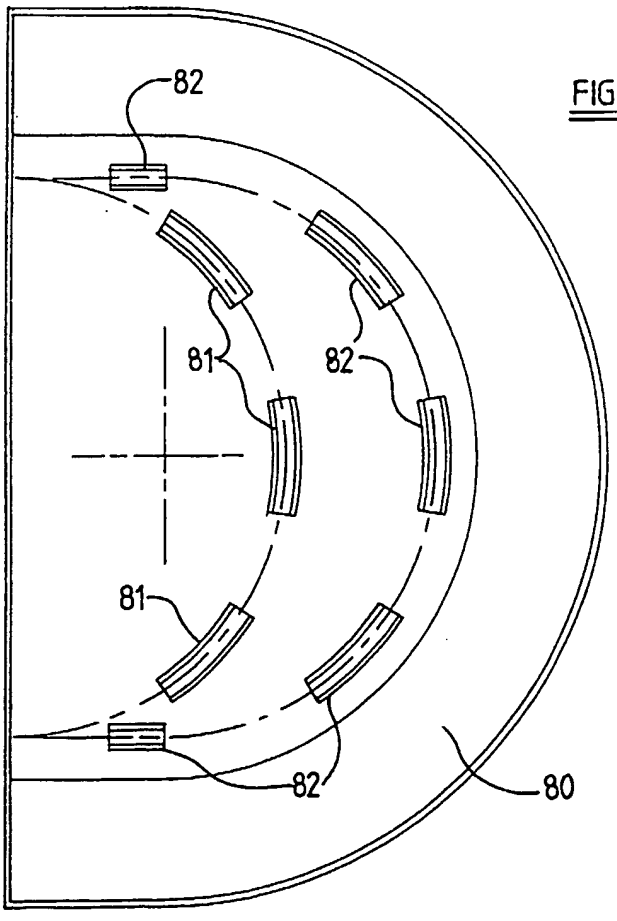
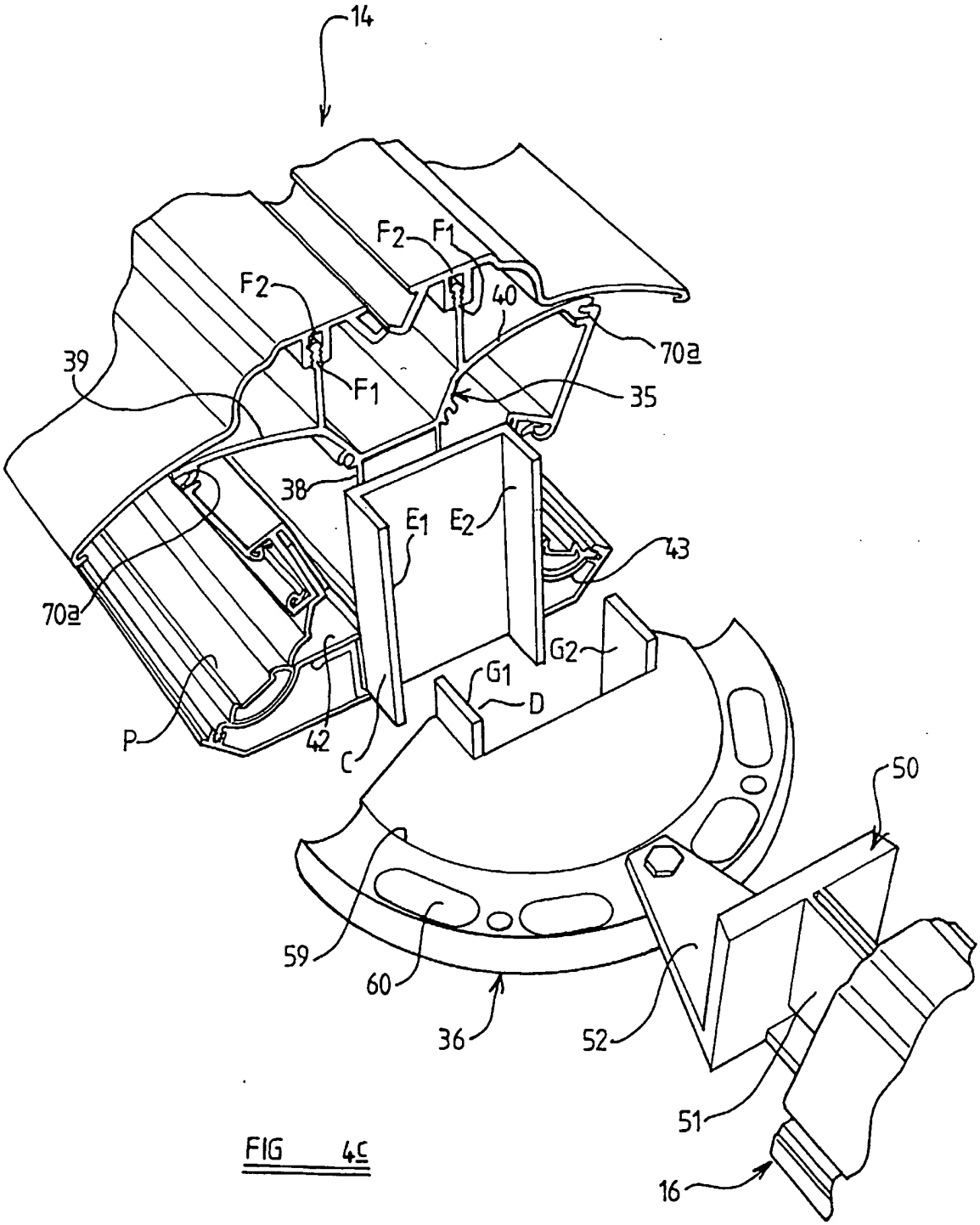



FIG 4b




14
F2
F1
F2
40
70a
39
F1
35
38
E1
E2
43
70a
G2
G1
D
P
42
C
50
59
60
36
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16

FIG 4c

FIG 5

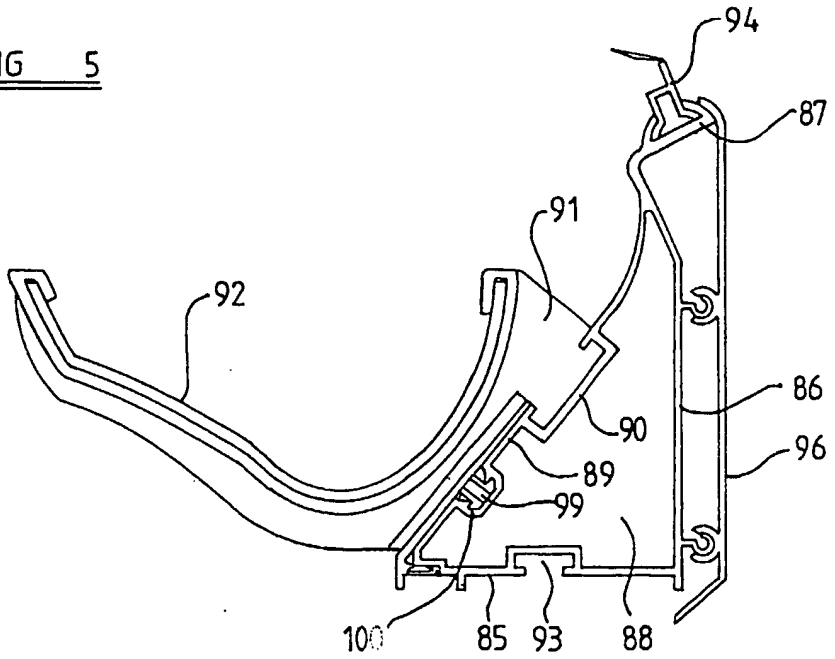
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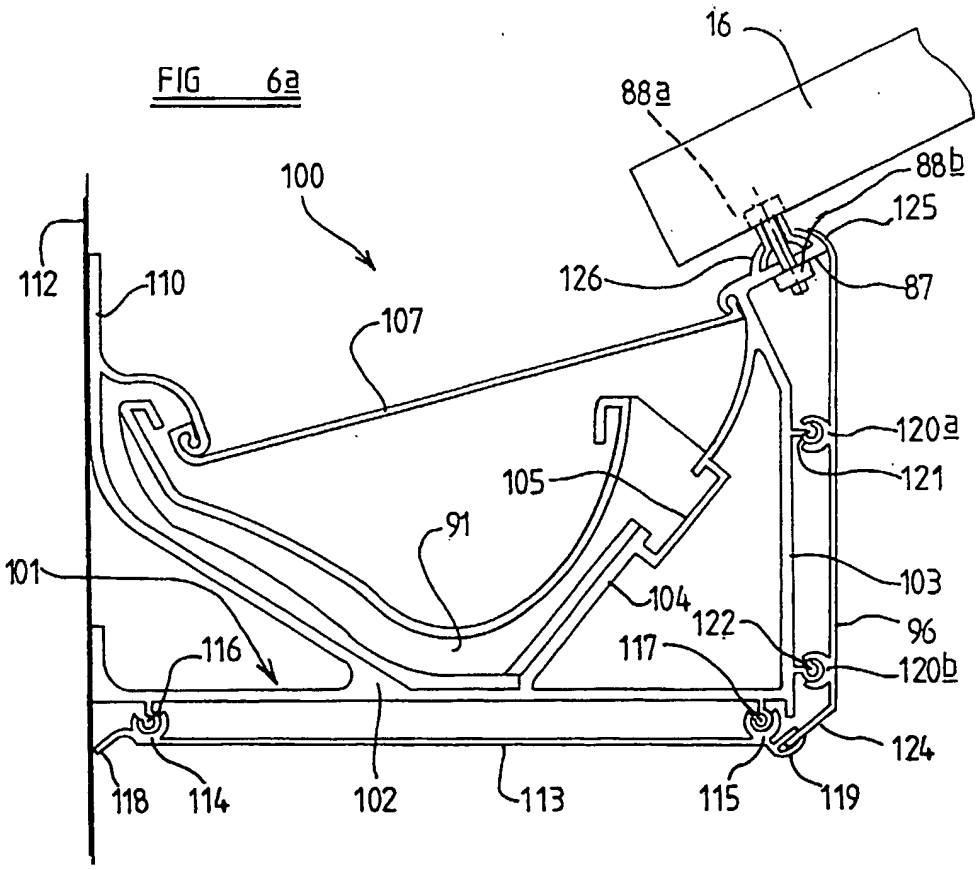
FIG 6a


16
88a
88b
125
126
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100
112
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107
120a
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120b
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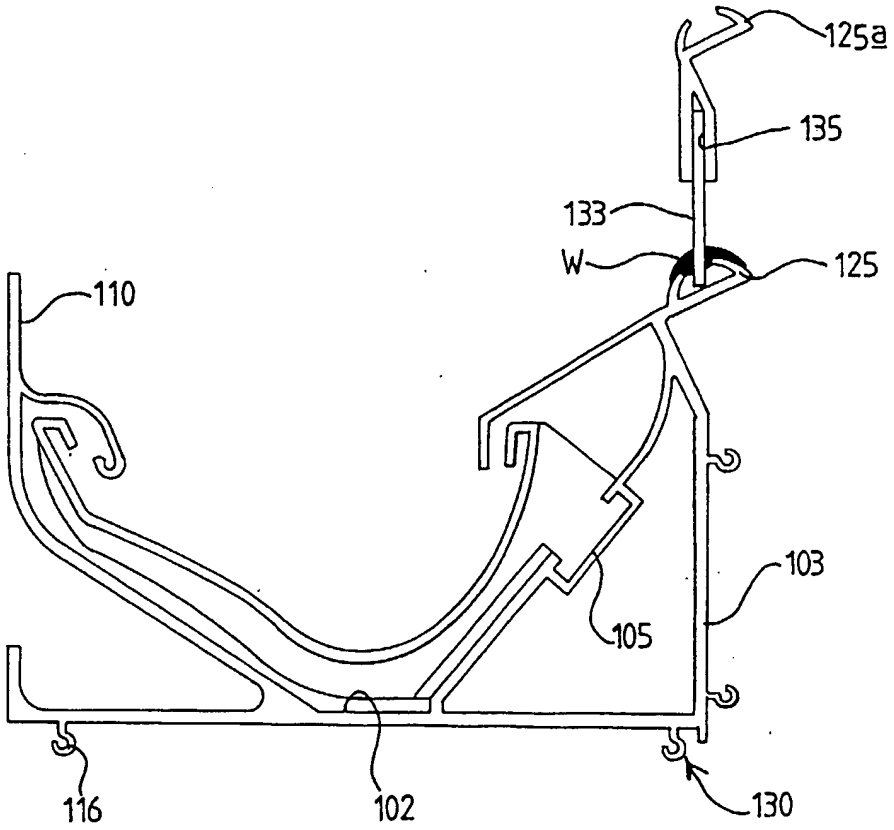


FIG 6b

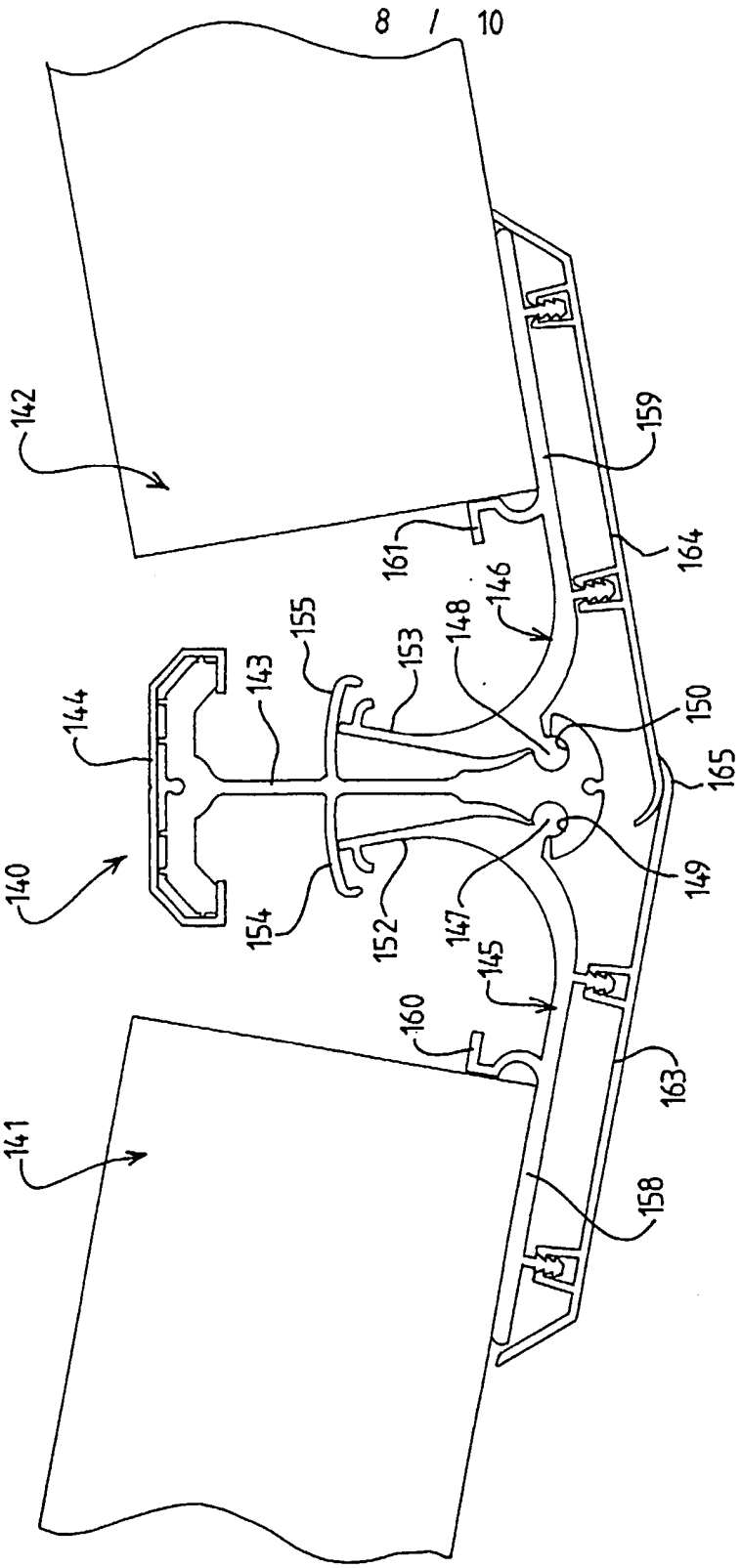
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FIG 7

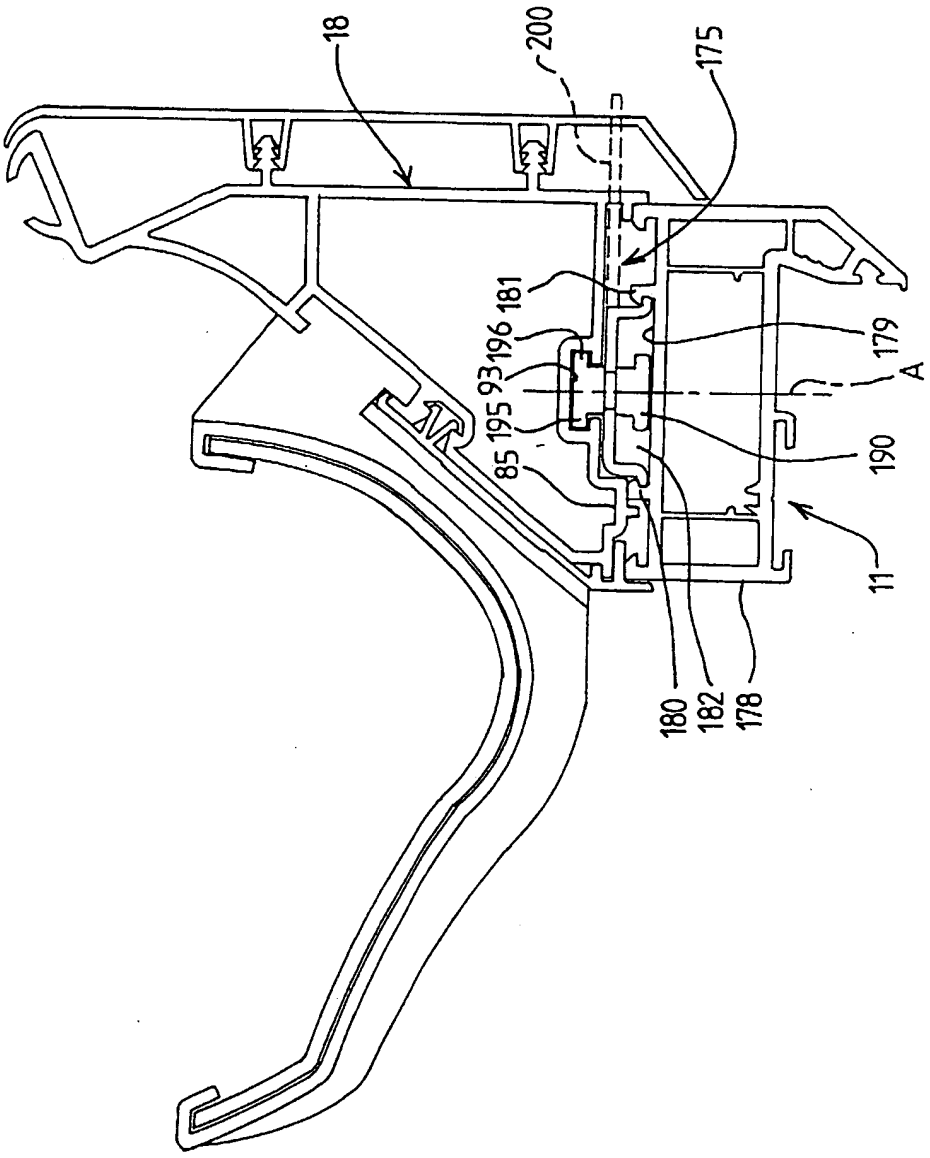


FIG 8a

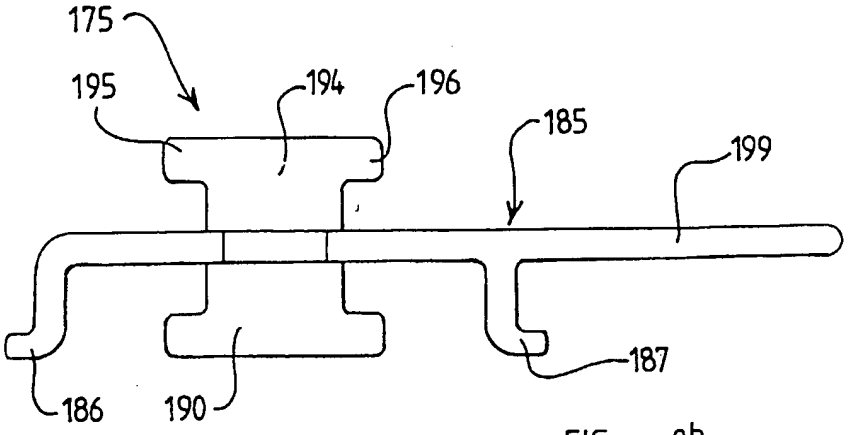


FIG 8b

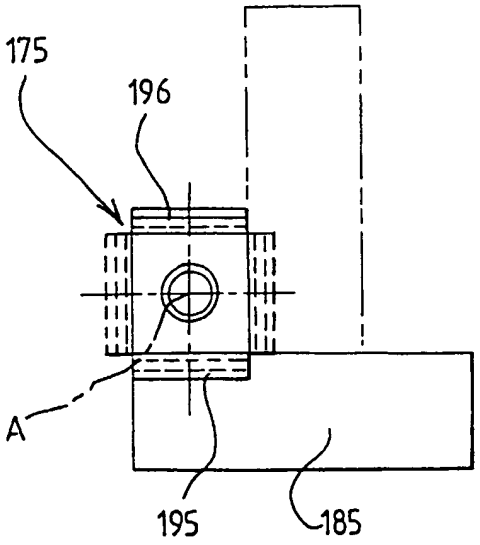


FIG 8c

PATENTS ACT 1977

A10327GB/DJL

Title: Method of Assembling a Building Construction

Description of Invention

This invention relates to a method of assembling a building construction of the kind including a wall structure having a plurality of wall frames, and a roof structure mounted on the wall structure, and to a construction and a roof structure.

A roof structure typically includes a ridge assembly from which extend downwardly towards the wall structure a plurality of rafters, and at least one eaves member secured to the wall structure and having secured thereto by fasteners, the rafters.

However in known constructions, it is necessary to provide one or more openings through the rafters and the eaves member to receive the fasteners, which have to be tightened from above the rafters.

According to a first aspect of the invention we provide a method of assembling a building construction of the kind including a wall structure and a roof structure mounted on the wall structure, the roof structure including a ridge assembly from which extend downwardly towards the wall structure, a plurality of rafters, and at least one eaves member secured to the wall structure and having secured thereto the rafters, the method being characterised in that the method includes securing the rafters to the eaves member or members and/or to the ridge assembly, by operating fastening means from below the rafters only.

Thus in accordance with the present invention, access is not required above the rafters, thus avoiding any requirement for an operator to climb exteriorly of the construction to tighten the fastener means.

In one embodiment the rafters each include a captive threaded element of the fastening means and the method includes screwing a correspondingly

threaded element of the fastening means into engagement with the captive threaded element which passes through an attachment portion of the eaves member amd/or the ridge assembly, from below the rafter. For example, the rafters may each include a re-entrant channel formation which extends from an end of the rafter, along the rafter, and the method includes feeding a head of a male threaded element into the re-entrant channel from an end of the rafter (which may be achieved prior to lifting a rafter into position), providing an opening in the attachment portion of the eaves member and/or the ridge member, inserting a shank of the male threaded element through the opening in the attachment portion, and engaging a female threaded element with the male threaded shank.

The captive head of the male threaded element may easily be slid along the re-entrant channel into alignment with the opening provided in the attachment portion (which opening may be pre-drilled prior to lifting the rafter into position) from below the rafter.

Further to facilitate assembling the construction at least one of the eaves member and the wall structure may include a re-entrant formation, and there may be provided a turnbuckle latch fastener having securing formations. Thus the method may include rotating the turnbuckle latch fastener to bring the securing formations into co-operation with the re-entrant formation, to secure the eaves member to the wall structure. Again this may be achieved from within the wall structure and from below.

For example both of the eaves member and the wall structure may include mutually facing re-entrant formations, and the turnbuckle latch fastener being mounted in one of the formations for rotation to bring the securing formations into co-operation with the re-entrant formation of the other member or structure.

Thus the need for threaded fastener elements is avoided.

Moreover, the turnbuckle latch member may be rotatable from inside the construction defined by the wall structure.

The ridge assembly may include a ridge member which extends outwardly from a superstructure, and a radius end member at an outermost free end of the ridge member, the method including attaching rafters to the radius end member and/or to the ridge member by operating fastener means from below the rafters. Thus again any necessity for an operator to climb on the construction to tighten fasteners to attach rafters to the radius end member and/or to the ridge member is avoided.

In one example there are provided connectors, each connector being secured to a rafter, (preferably prior to lifting the rafter into position), and being received by a receiving formation of the radius end member, each connector including an integral or separate rounded formation, and the receiving formation of the radius end member including a corresponding rounded formation. Thus the method may include receiving the rounded formation of the connector in the rounded receiving formation of the radius end member, adjusting the angle of the rafter to the radius end member as necessary for the construction, and providing an opening through the rounded receiving formation in an appropriate position to receive a threaded shank of a male threaded fastener element of fastener means, and screwing onto the male threaded element, from beneath, a correspondingly female threaded fastener element of the fastener means.

Again to avoid an operator having to climb on the construction to attach the rafters to the radius end member, preferably the male threaded fastener element is held captive by the connector as the female threaded fastener element is screwed onto the male threaded shank from beneath.

The roof structure will include infill panels which extend between pairs of rafters. Preferably, at least one of the infill panels may be mounted relative to

the ridge assembly on a carriage which permits the angle of the infill panel relative to the ridge assembly to be adjusted for a particular construction.

This may be achieved in that the ridge assembly may include a ridge member which extends outwardly from a superstructure, and a radius end member at an outermost free end of the ridge member, the ridge member including a rounded receiving formation and the carriage for the infill panel including a corresponding rounded formation, the method including attaching the infill panel to the carriage, receiving the rounded formation of the carriage in the rounded formation of the ridge member, and adjusting the angle of the carriage relative to the ridge member for the particular construction.

The carriage may include a first, preferably structural metal, element which is received by the ridge member, and a second preferably non-metallic, element to which the infill panel is attached, there being a sealing means between the second element and the infill panel and between the second element and the ridge member.

The radius end member and the ridge member may have interengaging means which permit the radius end member to be vertically located relative to the ridge member in a variety of different positions. Preferably the radius end member may slide vertically relative to the ridge member and be fixed in a desired relative vertical location by fixing means.

The construction may include a box gutter assembly between the roof structure and an adjacent superstructure, which box gutter assembly may include a gutter support member having a base wall and an upstanding wall, each of the base wall and the upstanding wall including a cladding mounting means to enable cladding to be mounted on the support member to conceal the support member from view inside the construction, the cladding for the upstanding wall including at least one cladding member having at a first side, a formation by means of which the cladding member may be selectively be connected to the cladding member of the base wall or to a second formation of

an identical second cladding member of the upstanding wall, and at the other end the first cladding member having a second formation which may selectively be connected to a first formation of another cladding member or engaged with a rafter attachment portion provided at an upper end of the upstanding wall.

In this way, regardless of the height of the upstanding wall, this may be clad with one or a plurality of identical cladding members.

If desired, the upstanding wall of the box gutter assembly may include a receiving means for an extension leg, whereby the upstanding wall can be extended by inserting and preferably fixing in watertight manner, an extension leg in the receiving means.

The rafters of the roof structure may each include an upper capping member which is adapted to be secured relative to a structural body of the rafter, the upper capping member including a pair of legs which in use extend downwardly from a top of the upper capping member, the legs each having an integral gasket which extends inwardly towards the structural body of the rafter, the method including securing the upper capping member to the rafter body, such that the gaskets each engage with a respective infill panel supported by the rafter so as not to be visible exteriorly of the upper capping member.

The rafters may each include a lower capping member which is adapted to be secured relative to a structural body of the rafter, the lower capping member including a re-entrant channel formation in which a lower part of the structural body of the rafter is in use received and concealed by the lower capping member, the lower capping member including a pair of mutually inwardly facing flanges which provide the re-entrant channel formation, and there being a gasket adapted in use to extend between each flange and a respective infill panel so as not to be visible exteriorly of the lower capping member.

The gaskets may be integrally provided by the lower capping member.

The construction may include a valley structure between two adjacent sections of the roof structure, the valley construction including a valley body member, and a pair of generally L-shaped valley members each pivotally mounted with respect to the valley body member, to accommodate a desired valley angle for a particular construction. Thus the method may include placing on each of the L-shaped valley members a roof section, and pivoting the L-shaped valley members relative to the valley body to achieve a desired valley angle.

According to a second aspect of the invention we provide a method of securing a part of a roof structure to a wall structure of a building construction, wherein the roof structure includes at least one eaves member and at least one of the eaves member and the wall structure including a re-entrant formation, the method including rotating a turnbuckle latch fastener to bring securing formations of the latch fastener into co-operation with the re-entrant formation or formations, to secure the eaves member to the wall structure.

According to a third aspect of the invention we provide a method of assembling a building construction of the kind including a wall structure and a roof structure mounted on the wall structure, the roof structure including a ridge assembly from which extend downwardly towards the wall structure a plurality of rafters, the ridge assembly including a ridge member which extends outwardly from a superstructure, and a radius end member at an outermost free end of the ridge member, the method including attaching rafters to the radius end member via respective connectors, each connector being secured to the rafter and being received by a receiving formation of the radius end member, the connector including an integral or separate rounded formation and the receiving formation including a corresponding rounded formation, the method including receiving the rounded formation of the connector in the rounded receiving formation of the radius end member, adjusting the angle of the rafter to the radius end member as necessary for the construction, and providing an

opening through the rounded formation of the radius end member or ridge member to receive a threaded shank of a male threaded fastener element, and screwing onto the male threaded fastener element a correspondingly female threaded fastener element.

According to a fourth aspect of the invention we provide a method of assembling a building construction of the kind including a roof structure including a ridge assembly from which extend downwardly towards the wall structure, a plurality of rafters, the ridge assembly including a ridge member which extends outwardly from a superstructure, and a radius end member at an outermost free end of the ridge member, the radius end member and the ridge member having interengaging means which permit the radius end member to be vertically located relative to the ridge member in a variety of different positions.

According to a fifth aspect of the invention we provide a method of assembling a building construction of the kind including a wall structure, and a roof structure mounted on the wall structure and a box gutter assembly between the roof structure and an adjacent superstructure, the box gutter assembly including a gutter support member having a base wall and an upstanding wall, characterised in that each of the base wall and the upstanding wall includes a cladding mounting means to enable cladding to be mounted on the support member to conceal the support member from view inside the construction, the cladding for the upstanding wall including at least one cladding member having at a first side a formation by means of which the cladding member may be selectively be connected to the cladding member of the base wall or to a second formation of an identical second cladding member of the upstanding wall, and at the other end the first cladding member having a second formation which may selectively be connected to a first formation of another cladding member or engaged with a rafter attachment portion provided at an upper end of the upstanding wall.

According to a sixth aspect of the invention we provide a method of assembling a building construction of the kind including a wall structure, and a roof structure mounted on the wall structure and a box gutter assembly between the roof structure and an adjacent superstructure, the box gutter assembly including a gutter support member having a base wall and an upstanding wall, the upstanding wall of the box gutter assembly including a receiving means for an extension leg, whereby the upstanding wall can be extended by inserting an extension leg in the receiving means.

According to a seventh aspect of the invention we provide a rafter for a roof structure of the kind having a plurality of rafters which support infill panels therebetween, the rafter including a structural body and an upper capping member to conceal an upper part of the structural body, the upper capping member including a pair of legs which in use extend downwardly from a top of the upper capping member, the legs each having an integral gasket which extends inwardly towards the structural body of the rafter, and in use engages with a respective infill panel supported by the rafter so as not to be visible exteriorly of the upper capping member.

According to an eighth aspect of the invention we provide a rafter for a roof structure of the kind having a plurality of rafters which support infill panels therebetween, the rafter including a structural body and a lower capping member to conceal a lower part of the structural body, the lower capping member being adapted to be secured relative to the structural body of the rafter, the lower capping member including a re-entrant channel formation in which the lower part of the structural body of the rafter is in use received, the lower capping including a pair of mutually inwardly facing flanges which provide the re-entrant channel formation, and there being a gasket adapted in use to extend between each flange and a respective infill panel so as not to be visible exteriorly of the lower capping member, the gaskets being integrally provided by the lower capping member.

According to a ninth aspect of the invention we provide a building construction of the kind including a wall structure having a plurality of wall frames, and a roof structure mounted on the wall structure includes a valley structure between two adjacent sections of the roof structure, the valley construction including a valley body member, and a pair of generally L-shaped valley members each pivotally mounted with respect to the valley body member, to accommodate a desired valley angle for a particular construction.

The invention will now be described with the aid of the accompanying drawings in which:-

FIGURE 1 is an illustrative view of part of a building construction assembled by the method of the invention;

FIGURE 2 is a detailed end view of a rafter of the construction of figure 1;

FIGURE 3 is a detailed end view of a ridge member of the construction of figure 1;

FIGURES 4a, 4b and 4c are respective side, plan and exploded perspective illustrative views of a radius end member of the construction of figure 1;

FIGURE 5 is a side view of an eaves member of the construction of figure 1;

FIGURE 6a is a side view of a first embodiment of a box gutter assembly for use in a construction assembled by the method of the invention;

FIGURE 6b is a side view of a the box gutter assembly of figure 6 but modified;

FIGURE 7 is an end illustrative view of a valley structure for use in a construction assembled by the method of the invention;

FIGURE 8a is side cross sectional illustrative view through an alternative eaves structure for use in a construction assembled by the method of the invention;

FIGURE 8b is a detailed enlarged view of part of the eaves structure of figure 8;

FIGURE 8c is a plan view of the part shown in figure 8b.

Referring to figure 1 of the drawings, a building construction 10 which in this instance is a conservatory, includes a wall structure 11, which typically includes a plurality of wall frame units which rest on a foundation or on a dwarf wall on the foundation, the frame units of the wall structure 11 being connected together by fasteners to provide the wall structure 11.

Mounted on the wall structure 11 there is a roof structure 12 which includes a ridge assembly 14, a plurality of rafters 16 which extend downwardly from the ridge assembly 14 to the wall structure 11, and are secured to an eaves member 18 which is secured to a top of the wall structure 11. The rafters 16 support infill panels 20 therebetween, which typically are multi-wall polycarbonate, but may be (single or multi-) glass panels as desired.

Referring to figure 2, the rafters 16 each have a structural body 22 typically made by extrusion, in aluminium or the like, the structural body 22 having a main central upstanding web 23 which terminates at the uppermost end in a male multi-ramp or "fir tree formation 24 which is adapted to connect an upper capping member 25 to the structural body 22 as hereinafter described. The structural rafter body 22 further includes a pair of outwardly extending flanges 26, 27 which are re-entrant, having mutually inwardly extending flanges 28, 29. Between the flanges 26, 27 there is a central downwardly opening re-entrant channel 30.

The rafters 16 further include a lower capping member 32 which conceals the lower part of the structural body 22.

The upper capping member 25 includes a female formation 29a adapted to receive the male multi-ramped formation 24 of the structural body 22 as an interference fit. The female formation 29 may be provided with internal ramps as shown to co-operate with the ramps of the male formation 24. It will be

appreciated that by forcing the upper capping member 25 downwardly the upper capping member 25 may be tightly and securely secured to the structural body 22.

The upper capping member 25 further includes a pair of legs 30, 31 which extend downwardly from the top of the upper capping member 25. The upper capping member 25 is preferably made in a suitable plastic material, e.g. as an extrusion, and desirably, integrally provided with each leg 30, 31, at the lowest end of each leg, 30, 31, there is a co-extruded gasket 30a, 31a respectively. The gaskets 30a, 31a, preferably extend mutually towards one another and towards the central web 23 of the structural body 22.

The gaskets 30a, 31a are each adapted to provide an invisible seal with an upper surface 20a of a respective infill panel 20.

The lower capping member 32 is preferably a plastic extrusion too, having a pair of mutually inwardly facing flanges 33, 34, each with an integrally formed, e.g. co-extruded gasket 33a, 34a. Thus the lower capping member is of re-entrant configuration, receiving the lower part of the structural body 22 and concealing the lower part of the structural body 22. The gaskets 33a, 34a are mutually inwardly facing, and in use are accommodated between the flanges of the lower capping member 32 and a lower surface 20b of respective infill panels 20.

It will be appreciated that by virtue of the respective gasket configurations and constructions, the gaskets 30a, 31a of the upper capping member 25 and the gaskets 33a, 34a of the lower capping member 32 will be concealed and thus no visible exteriorly of the respective capping members 25, 32 thus improving the appearance of the conservatory 10.

Referring also to figures 3, 4a, 4b and 4c, the ridge assembly 14 includes in this example a ridge member 35 which extends outwardly of a superstructure such as an adjacent wall and an outermost free end of the ridge member 35.

The ridge member 35 includes a central web arrangement 38 formed as a box section, with, at an uppermost end thereof, a pair of upper outwardly extending flanges 39, 40 which are of curved generally cylindrical configuration for a purpose hereinafter described. The box section 38 further includes, at a lower end thereof, a pair of lower outwardly extending flanges 42, 43, each of which includes a rounded, generally cylindrical receiving formation 45, 46 respectively.

In use, rafters 16 are secured to the ridge member 35, on the lower outwardly extending flanges 42, 43 which provide attachment portions. This is achieved by the rafters 16 each having a re-entrant channel 30 in their undersides, in which there is held captive against rotation, a head of a male threaded fastener e.g. a bolt. This arrangement is described in more detail below with reference to figure 5.

The shanks of the bolts are received in aligned openings in a pivoting section P which is received in pivoting manner in a respective one of the rounded formations 45, 46 of the outstanding lower flanges 42, 43 of the ridge member 35, and upon construction, female threaded fastener elements, i.e. nuts, are screwed onto the male threaded shanks from beneath to secure the rafters 16 to the ridge member 35

Thus the angles of the rafters 16 relative to the ridge member 35 can be adjusted and the angle set by the respective fastening means.

The ridge member 35 includes an upper capping 37 which is secured to the upper flanges 39, 40 by respective co-operating fir tree F1 and appropriate recesses F2 formations.

The radius end member 36 is adapted to be secured to the end of the ridge member 35 as best appreciated from figure 4c. Whereas the radius end member 36 may be secured to the ridge member 35, for example with a part of the radius end member 36 being received in the box section 38, preferably, the vertical location of the radius end member 36 relative to the ridge member 35

can be adjusted and set, so that variations in the angles of the rafters 16 relative to the ridge member 35 can be accommodated by the radius end member 36.

As indicated in figure 4c, preferably there is provided a vertically extending channel shaped member C attached to the ridge member 35, e.g. by a part of the channel shaped member C being received within the box section 38 of the ridge member 35, or otherwise, with the channel opening towards the radius end member 36. The radius end member 36 includes a vertically extending channel formation D, the channel of which opens towards the channel shaped member C attached to the ridge member 35. Side limbs E1 and E2 of the channel shaped member C of the ridge member 35 are spaced wider apart in this example, than the side limbs G1, G2 of the channel formation D of the radius end member 36.

Thus the channel formation D may be interengaged within the channel shaped member C of the ridge member 35 and the radius end member 36 may be slid upwardly and downwardly during construction, to a desired relative vertical location relative to the ridge member 35. When the radius end member 36 is in a desired vertical location, fasteners may be passed through the adjacent side limbs E1, G1 and E2, G2 to set the vertical location of the radius end member 36 relative to the ridge member 35, as required by the construction 10.

The radius end member 36 has a part circular flange 59 with a non-continuous circumferentially extending rounded receiving formation 60 to which rafters 16 may be secured via connectors 50 at any angle required by the construction. The connectors 50 are fastened by fasteners e.g. screws, to the central webs 23 at the ends of the rafters 16 prior to lifting the respective rafters 16 into position. The connectors 50 may even be factory fitted.

Each connector 50 includes a first part 51 which extends generally upright and lies alongside the respective central web 23 of a rafter 16, and a second part 52 which is in a plane generally perpendicular to the first part 51, and extends contiguously with the re-entrant flanges 26, 27 of the rafter. The

second parts may extend alongside the flanges 26, 27 of the rafters 16, or, to make space for the connectors 50, the flanges 26, 27 may be removed at the ends of the rafters 16 to make room for the second parts 52 of the connectors 50.

The second parts 52 of the connectors 50 each further include a respective integral, or preferably separately formed rounded male formation 54 which is adapted to received by the rounded receiving formation 60 of the radius end member 36, which rounded formation 54 may thus pivot relative to the radius end member 36, to allow the rafter 16 to be set in an infinite number of different angular orientations relative to the radius end member 36, to suit a particular building construction 10 configuration. The second parts 52 of the connectors preferably also include an opening 55 for a male threaded fastener element 56, such that a head of the male threaded fastener element 56 is held captive against rotation relative to the second part 52 of the connector 50, as a female threaded fastener element 57 is screwed thereon.

Upon assembly of the construction 10, when the angular position of the rafter 16 relative to the radius end member 35 is set , the shank of the male threaded fastener element 57 is passed through an opening provided in a respective rounded receiving formation 45, 46 in a lower flange 42, 43 of the ridge member 35, and the rafter 16 is secured by screwing onto the shank a female threaded fastener element 57. Thus a plurality of rafters 16 radiate from the radius end member 36 towards the eaves member 18.

The rafters 16 support the infill panels 20 therebetween. At the ridge member 35, edges of the panels 20 are received in recesses 65 in respective carriages 67. The carriages 67 each include a first, structural metal part 68 which includes an integral rounded male formation 68a which is adapted to be received in the rounded receiving formations 45, 46 between the rafters 16, and the first carriage parts 68 being connected to second, preferably plastic, carriage parts 69 which provide the recesses 65 for the edges of the panels 20, and rain

excluders 70 which extend upwardly and into engagement with the upper outwardly extending flanges 39, 40. The excluders 70 have seals 70a which form rain seals with the undersides of the flanges 39, 40.

It will be appreciated that as the angles of the rafters 16 are adjusted, the excluders 70 will remain in sealing contact with the undersides of the flanges 39, 40 by virtue of the curved configuration of the flanges 39, 40.

In the recesses 65 for the edges of the infill panels 20, there are seals 71 of the feed-in type, or provided as co-extrusions with the second parts 69 of the carriages 67, to ensure that rain seals are provided between the carriages 67 and the panels 20.

For the radius end 36, there is provided a depending curtain seal 77 which is secured to an upper radius end member cover plate 78, and is in sealing contact with the upper surfaces 20a of the panels 20 in-between the rafters 16. Below the part-circular flange 59 of the radius end member 36, there is provided a lower cover plate 80 to conceal the joints between the rafters 16 and the flange 59. The lower cover plate 80 has two sets of snap engagement formations 81, 82 at different radial positions. A selected set of the formations 81, 82 may be snap engaged with a corresponding part circular formation 83 provided at the end of the flange 59 of the radius end member 36, depending upon the angle of the rafters 16 relative to the radius end member 36 it is necessary to provide, for the particular building construction.

It will be appreciated that by virtue of the male threaded fastener elements 56 being held captive by the second parts 52 of the connectors 50, that each rafter 16 may be secured to the radius end member 36 from below, so that it is unnecessary for an operator to climb onto the exterior of the construction to perform these connections, after the rafters 16 have been lifted into position.

Referring now to figure 5 an eaves member 18 is shown which includes a base wall 85 which in use is mounted on the wall structure 11 below, and an

upstanding wall 86 which provides at an upper end thereof, an attachment portion 87 onto which in use rafters 16 are secured.

In this example, the eaves member 18 is a triangular section with an internal hollow 88, the hypotenuse 89 of which provides a mounting channel 90 for gutter brackets 91 which support a gutter 92 along a lower edge of the roof structure 12.

In accordance with the invention, the base wall 85 of the eaves member 18 has a re-entrant channel 93 for retaining captively, a female threaded fastener element (not shown). Thus to secure the eaves member 18 to the wall structure 11 beneath, a shank of male threaded fastener element needs to be passed upwardly through an opening in the wall structure 11 into engagement with the captive nut.

Moreover, rafters 16 may be secured to the attachment portion 87 of the eaves member 18 from below the rafters 16 by passing the shanks of male threaded fastener elements 88a (see figure 6a) downwardly through openings provided in the attachment portion 87, so that the shanks thereof may be engaged by female threaded elements 88b, while heads of the bolts 88a are held captive against rotation in the re-entrant channels 30 at the lower ends of the structural bodies 22 of the rafters 16.

In-between the rafters 16, the attachment portion 87 may mount seals 94. The attachment portions 87 in the example shown provide a channel for the seals 94 but may otherwise be constructed provided that the attachment portion 87 may both mount the seals 94 and enable a male captive threaded fastener element 88a to be engaged with a corresponding female threaded fastener element 88b.

It will be appreciated that male threaded fastener elements 88a may be received in the ends of the rafters 16 prior to lifting the rafters 16 into position if desired, but in any event it is unnecessary for an operator to access the tops of the rafters 16 in order to tighten the male and female threaded elements 88, 89

to secure the rafters 16 to the eaves members 18, because the male 88a, or if desired in another embodiment female 88b fastener elements, are held against rotation, in the channels 30.

Typically during construction, a plurality of the rafters 16, if not all, are positioned prior to being secured by their fastener means, to ensure of correct alignment, relative to the wall structure 11 and pre-cut infill panels 20. Thus tightening of the fastener means is sometimes performed after the infill panels 20 are in position, which with conventional constructions would require that an operator climbs onto the exterior of the construction. This is avoided with the present invention.

As shown, the upstanding wall 86 of the eaves member 18 is clad with a cladding member 96 to hide the eaves member 18 from view from inside the construction 10. Between the gutter brackets 91, to hide the eaves member 18, a cladding member 99 is provided which is mounted by a formation thereof being received in a mounting recess 100 of the eaves member 18.

Referring now to figure 6a there is shown a box gutter assembly 100 for a building construction which may be assembled by the method of the invention.

The box gutter assembly 100 includes a support member 101 having a base wall 102 and an upstanding wall 103, preferably integrally formed in aluminium or another suitable material. Also there is a wall 104 joining the base wall 101 and the upstanding wall 103, which provides a mounting recess 105 for a gutter support bracket 91 which is the same as the bracket 91 described above in relation to the eaves member 18. A bottom of the bracket 106 sits on the base wall 102 of the support member 101. Gutter straps 107 are provided at intervals between the upstanding wall 103 and a wall 110 which extends upwardly from the base wall 102 towards a superstructure 112 , such that the box gutter assembly 100 is positioned between the superstructure 112,

which may be an adjacent wall of a building, and the remainder of the construction 10.

To conceal the support member 101, cladding members 113, 96 are provided. Cladding member 113 conceals the base wall 102 of the support member 101, and has engagement formations 114, 115 which engage with corresponding engagement formations 116, 117 on the base wall 102, in snap fit manner although in another example, fir-tree type formations may be provided to be received in appropriate recesses of the cladding member 113, 91. The cladding member 113 has a first side with a lip formation 118, and an opposite second side with a recess 119.

Cladding member 91 conceals the upstanding wall 103 of the support member 101, and is similar to cladding member 113 with engagement formations 120a, 120b which engage with corresponding engagement formations 121, 122 provided on the upstanding wall 103 of the support member 101 to mount the cladding member 91. At a first lower side, the cladding member 91 has a lip formation 124 which is received in the recess 119 of cladding member 113, to join the two cladding members 113, 91 together. At its upper side, the cladding panel 91 is provided with a lip 125 which abuts an attachment portion 126 of the upstanding wall 103 which is similar to attachment portion 87 at the upper end of the upstanding wall 86 of the eaves member 18, the attachment portion 125 of the upstanding wall 103 of the support member 101 providing a mounting for rafters 16 in the same manner that the rafters 16 are secured to attachment portion 87 of the eaves member 18.

For different size box gutters 100, a plurality of cladding members 113 and/or 91 may be interconnected as necessary to provide sufficiently high and/or wide cladding to conceal the support member 101. Thus the cladding members 113, 91 are essentially modular.

Referring to figure 6b there is shown a box gutter assembly 130 similar to that shown at 100 in figure 6a, but modified. Similar parts being labelled by the same reference numerals.

The attachment portion 125 provides a receiving opening 132 to receive an extension leg 133, which typically would be made as aluminium sheet, to extend the upward extent of the upstanding wall 103. The extension leg 133 is preferable fixed in watertight manner in the receiving opening 132, for example as shown by welding W, although another fixing/sealing technique may be employed.

The leg 133 at its upper end is received in a recess 135 of a separate attachment portion 125a which provides a mounting for rafters 16. In this way, any height may be accommodated by using an extension leg 133 of an appropriate height, adjacent the conservatory or other building construction to extend the upstanding wall 103.

Referring now to figure 7 there is shown a valley structure 140 for use in a construction 10 assembled in accordance with the invention. The valley structure 140 is in use located between two adjacent roof sections 141, 142 which roof sections 141, 142 both slope downwardly towards the valley structure 140 so that water drains from the roof sections 141, 142 into the valley structure 140.

The valley structure 140 includes a valley body member 143 which is generally of T configuration. The upper end of the T may include a capping member 144 to conceal the valley body member 143 if desired.

The valley structure 140 also includes a pair of L-shaped valley members 145, 146, each of which includes a male pivot mounting 147, 148 respectively, each pivot mounting 147, 148 being a generally part-cylindrical formation formed on the exterior of the L. The pivot mountings 147, 148 are each received in respective part cylindrical female mounting 149, 150 in a lower part of the valley body member 143 so that the L-shaped members 145,

146 may each pivot relative to the valley body member 143 to accommodate different valley angles, appropriate to different roof structures.

Upstanding limbs 152, 153 of the L-shaped valley members 145, 146 provide rain deflectors, and co-operate with outstanding arms 154, 155 of the valley body member 143 to prevent ingress of rain between the upstanding limbs 152, 153. Lower limbs 158, 159 of the L-shaped members 145, 146 provide supports for the roof sections 141, 142, and have respective stops 160, 161 against which rafters 16/infill panels 20 of the roof sections 141, 142 may abut.

To conceal the valley structure 140 above, cladding members 163, 164 are provided which are attached via formations provided on the undersides of the lower limbs 158, 159 of the L-shaped members 145, 146. The two cladding members 163, 164 may relatively pivot with the L-shaped members 145, 146, the cladding members 163, 164 overlapping at the lowest point 165. When the valley angle is set, the overlap 165 may be concealed with an adhesive tape.

Referring now to figures 8a, 8b, and 8c, an alternative means of securing an eaves member 18 to a wall structure 11 to that described above is shown.

In this embodiment, threaded fastener elements are not required, but rather, a plurality of turnbuckle latch fasteners 175 spaced along the eaves member 18, are utilised.

The eaves beam 18 is similar to that shown in figure 5 with the same reference numerals being used where appropriate.

The wall structure 11 includes an upper frame member 178 which is a plastic hollow section as is well known in the art, and which provides at an upper surface 179, a pair of nibs 180, 181 which by virtue of their configuration provide a re-entrant channel 182 between them.

The re-entrant channel 93 in the base wall 85 of the eaves member 18 is opposite the re-entrant channel 182 of the upper surface 179 of the upper frame

member 178, and in a space 184 between the channels 93 and 182, the turnbuckle latch fasteners 175 are accommodated.

In this example, the latch fasteners 175 are secured relative to the upper frame member 178. The latch fasteners 175 each have a main body 185 with a pair of downwardly and mutually outwardly facing nibs 186, 187, which co-operate with the nibs 180, 181 of the frame member 178, in snap interfit fashion. Attached to the main body 185 of the latch fastener 175, between the nibs 186, 187, is a boss 190, which may be fastened to the upper frame member 178 e.g. by a fastener passing through the member 178, such as to allow the latch fastener 175 to rotate about an axis of rotation A as hereinafter described.

On an upper side 192 of the main body 185 of the latch fastener 175, there is a further boss 194 which has a pair of oppositely outwardly extending securing formations 195, 196. It can be seen in figure 8a, that the securing formations 195, 196 are received within the re-entrant channel 93 of the eaves member 18, and overlie the mouth of the channel 93 so that the boss 194 is secured in the channel 93.

However, as will be appreciated from figure 8c, upon rotation of the latch fastener 175 through 90°, the width of the boss 194 where the securing formations 195, 196 are not provided, allows the boss 194 to enter/exit the re-entrant channel 93 of the eaves member 18.

The main body 185 of the latch fastener 175, includes a manually operable handle part 199 which is arranged to extend inwardly of the construction 10, with an opening being provided for it as necessary in the eaves member 18, e.g. as indicated at 200.

Thus to secure the eaves member 18 to the upper frame member 178 of the wall structure 11, the latch fastener 175, or more typically latch fasteners, are rotated relative to the upper frame member 178 to positions where the upper bosses 194 with the securing formations 195, 196 can be received in the re-entrant channel 93 of the eaves member 18. The eaves member 18 is then

placed on the upper frame member 178 with the upper bosses 194 being received in the re-entrant channels 93. The turnbuckle latch fasteners 175 are then each rotated through 90°, using the handle parts 199, whereby the securing formations 195, 196 retain the bosses 194 in the re-entrant channels 93 thus to secure the eaves member 18 in position.

Various modifications may be made without departing from the scope of the invention. For examples, the configurations of the rafters 16, eaves member 18 and ridge assembly 14 and other components described may be varied, although preferably, in accordance with the first aspect of the invention, the rafters 16 may be secured to the eaves member 18 and to the ridge assembly 14 without an operator having to climb on the construction 10.

The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

CLAIMS

1. A method of assembling a building construction of the kind including a wall structure, and a roof structure mounted on the wall structure, the roof structure including a ridge assembly from which extend downwardly towards the wall structure, a plurality of rafters, and at least one eaves member secured to the wall structure and having secured thereto the rafters, the method being characterised in that the method includes securing the rafters to the eaves member or members and/or to the ridge asembly, by operating fastening means from below the rafters only.

2. A method according to claim 1 characterised in that the rafters each include a captive threaded element of the fastening means and the method includes screwing a correspondingly threaded element of the fastening means into engagement with the captive threaded element which passes through an attachment portion of the eaves member and/or ridge assembly, from below the rafter.

3. A method according to claim 2 characterised in that the rafters each include a re-entrant channel formation which extends from an end of the rafter, along the rafter, and the method includes feeding a head of a male threaded element into the re-entrant channel from an end of the rafter, providing an opening in the attachment portion of the eaves member and/or ridge assembly, inserting a shank of the male threaded element through the opening in the attachment portion , and engaging a female threaded element with the male threaded shank.

4. A method according to claim 1 characterised in that at least one of the eaves member and the wall structure includes a re-entrant formation, and there

is provided a turnbuckle latch fastener having securing formations, and the method includes rotating the turnbuckle latch fastener to bring the securing formations into co-operation with the re-entrant formation, to secure the eaves member to the wall structure.

5. A method according to claim 4 characterised in that both of the eaves member and the wall structure include mutually facing re-entrant formations, and the turnbuckle latch fastener is mounted in one of the formations for rotation to bring the securing formations into co-operation with the re-entrant formation of the other member or structure.

6. A method according to claim 4 or claim 5 characterised in that the turnbuckle latch fastener is rotatable from inside the construction defined by the wall structure.

7. A method according to any one of the preceding claims characterised in that the ridge assembly includes a ridge member which extends outwardly from a superstructure, and a radius end member at an outermost free end of the ridge member, the method including attaching rafters to the radius end member and/or to the ridge member by operating fastener means from below the rafters.

8. A method according to claim 7 characterised in that there are provided connectors, each connector being secured to a rafter and being received by a receiving formation of the radius end member, each connector including an integral or separate rounded formation and the receiving formation of the radius end member including a corresponding rounded formation, the method including receiving the rounded formation of the connector in the rounded receiving formation of the radius end member, adjusting the angle of the rafter to the radius end member as necessary for the construction, and providing an

opening through the rounded receiving formation to receive a threaded shank of a male threaded fastener element of fastener means, and screwing onto the male threaded element from beneath, a correspondingly female threaded fastener element of the fastener means.

9. A method according to claim 7 or claim 8 characterised in that the male threaded fastener element is held captive by the connector as the female threaded fastener element is screwed onto the male threaded shank.

10. A method according to any one of the preceding claims characterised in that the roof structure includes infill panels which extend between pairs of rafters, at least one of the infill panels being mounted relative to the ridge assembly on a carriage which permits the angle of the infill panel relative to the ridge assembly to be adjusted for a particular construction.

11. A method according to claim 10 characterised in that ridge assembly includes a ridge member which extends outwardly from a superstructure, and a radius end member at an outermost free end of the ridge member, the ridge member including a rounded receiving formation and the carriage for the infill panel including a corresponding rounded formation, the method including attaching the infill panel to the carriage, receiving the rounded formation of the carriage in the rounded formation of the ridge member, and adjusting the angle of the carriage relative to the ridge member for the particular construction.

12. A method according to claim 10 or claim 11 characterised in that the carriage includes a first element which is received by the ridge member, and a second element to which the infill panel is attached, there being a sealing means between the second element and the infill panel and between then second element and the ridge member.

13. A method according to any one of the preceding claims characterised in that the radius end member and the ridge member have interengaging means which permit the radius end member to be vertically located relative to the ridge member in a variety of different positions.

14. A method according to claim 13 characterised in that the radius end member is slid vertically relative to the ridge member and fixed in a desired relative vertical location by fixing means.

15. A method according to any one of the preceding claims characterised in that the construction includes a box gutter assembly including a gutter support member having a base wall and an upstanding wall, each of the base wall and the upstanding wall including a cladding mounting means to enable cladding to be mounted on the support member to conceal the support member from view inside the construction, the cladding for the upstanding wall including at least one cladding member having at a first side, a formation by means of which the cladding member may be selectively be connected to the cladding member of the base wall or to a second formation of an identical second cladding member of the upstanding wall, and at the other end the first cladding member having a second formation which may selectively be connected to a first formation of another cladding member or engaged with a rafter attachment portion provided at an upper end of the upstanding wall.

16. A method according to any one of the preceding claims characterised in that the construction includes a box gutter assembly between the roof structure and an adjacent superstructure, the box gutter assembly including a gutter support member having a base wall and an upstanding wall, the upstanding wall of the box gutter assembly including a receiving means for an extension leg,

whereby the upstanding wall can be extended by inserting an extension leg in the receiving means.

17. A method according to claim 16 characterised in that the extension leg is fixed in the receiving means in watertight manner.

18. A method according to any one of the preceding claims characterised in that the rafters each include an upper capping member which is adapted to be secured relative to a structural body of the rafter, the upper capping member including a pair of legs which in use extend downwardly from a top of the capping member, the legs each having an integral gasket which extends inwardly towards the structural body of the rafter, the method including securing the upper capping member to the rafter body, such that the gaskets each engage with a respective infill panel supported by the rafter so as not to be visible exteriorly of the upper capping member.

19. A method according to any one of the preceding claims characterised in that the rafters each include a lower capping member which is adapted to be secured relative to a structural body of the rafter, the lower capping member including a re-entrant channel formation in which a lower part of the structural body of the rafter is in use received and concealed by the lower capping member, the lower capping including a pair of mutually inwardly facing flanges which provide the re-entrant channel formation, and there being a gasket adapted in use to extend between each flange and a respective infill panel so as not to be visible exteriorly of the lower capping member.

20. A method according to claim 19 wherein the gaskets are integrally provided by the lower capping member.

21. A method according to any one of the preceding claims which includes a valley structure between two adjacent sections of the roof structure, the valley construction including a valley body member, and a pair of generally L-shaped valley members each pivotally mounted with respect to the valley body member, to accommodate a desired valley angle for a particular construction, the method including placing on each of the L-shaped valley members a roof section, and pivoting the L-shaped valley members relative to the valley body to achieve a desired valley angle.

22. A method of assembling a building construction substantially as hereinbefore described with reference to the accompanying drawings.

23. A method of securing a part of a roof structure to a wall structure of a building construction, wherein the roof structure includes at least one eaves member and at least one of the eaves member and the wall structure including a re-entrant formation, the method including rotating a turnbuckle latch fastener to bring securing formations of the latch fastener into co-operation with the re-entrant formation or formations, to secure the eaves member to the wall structure.

24. A method of securing a part of a roof structure to a wall structure substantially as hereinbefore described with reference to figures 8a, 8b and 8c of the accompanying drawings.

25. A method of assembling a building construction of the kind including a wall structure and a roof structure mounted on the wall structure, the roof structure including a ridge assembly from which extend downwardly towards the wall structure a plurality of rafters, the method including attaching rafters to

the radius end member via respective connectors, each connector being secured to the rafter and being received by a receiving formation of the radius end member, the connector including a rounded formation and the receiving formation including a corresponding rounded formation, the method including receiving the rounded formation of the connector in the rounded receiving formation of the radius end member, adjusting the angle of the rafter to the radius end member or ridge member as necessary for the construction, and providing an opening through the rounded formation of the radius end member to receive a threaded shank of a male threaded fastener element, and screwing onto the male threaded fastener element a correspondingly female threaded fastener element.

26. A method of assembling a building construction of the kind including a roof structure including a ridge assembly from which extend downwardly towards the wall structure, a plurality of rafters, the ridge assembly including a ridge member which extends outwardly from a superstructure, and a radius end member at an outermost free end of the ridge member, the radius end member and the ridge member having interengaging means which permit the radius end member to be vertically located relative to the ridge member in a variety of different positions.

27. A method of assembling a building construction of the kind including a wall structure, and a roof structure mounted on the wall structure and a box gutter assembly between the roof structure and an adjacent superstructure, the box gutter assembly including a gutter support member having a base wall and an upstanding wall, characterised in that each of the base wall and the upstanding wall includes a cladding mounting means to enable cladding to be mounted on the support member to conceal the support member from view inside the construction, the cladding for the upstanding wall including at least

one cladding member having at a first side a formation by means of which the cladding member may be selectively be connected to the cladding member of the base wall or to a second formation of an identical second cladding member of the upstanding wall, and at the other end the first cladding member having a second formation which may selectively be connected to a first formation of another cladding member or engaged with a rafter attachment portion provided at an upper end of the upstanding wall.

28 A method of assembling a building construction of the kind including a wall structure, and a roof structure mounted on the wall structure and a box gutter assembly between the roof structure and an adjacent superstructure, the box gutter assembly including a gutter support member having a base wall and an upstanding wall, the upstanding wall of the box gutter assembly including a receiving means for an extension leg, whereby the upstanding wall can be extended by inserting an extension leg in the receiving means.

29. A rafter for a roof structure of the kind having a plurality of rafters which support infill panels therebetween, the rafter including a structural body and an upper capping member to conceal an upper part of the structural body, the upper capping member including a pair of legs which in use extend downwardly from a top of the upper capping member, the legs each having an integral gasket which extends inwardly towards the structural body of the rafter, and in use engages with a respective infill panel supported by the rafter so as not to be visible exteriorly of the upper capping member.

30. A rafter for a roof structure of the kind having a plurality of rafters which support infill panels therebetween, the rafter including a structural body and a lower capping member to conceal a lower part of the structural body, the lower capping member being adapted to be secured relative to the structural

body of the rafter, the lower capping member including a re-entrant channel formation in which the lower part of the structural body of the rafter is in use received, the lower capping including a pair of mutually inwardly facing flanges which provide the re-entrant channel formation, and there being a gasket adapted in use to extend between each flange and a respective infill panel so as not to be visible exteriorly of the lower capping member, the gaskets being integrally provided by the lower capping member.

31. A rafter for a building construction substantially as hereinbefore described with reference to and as shown in figure 2 of the accompanying drawings.

32. A building construction of the kind including a wall structure having a plurality of wall frames, and a roof structure mounted on the wall structure includes a valley structure between two adjacent sections of the roof structure, the valley construction including a valley body member, and a pair of generally L-shaped valley members each pivotally mounted with respect to the valley body member, to accommodate a desired valley angle for a particular construction.

33. A building construction substantially as hereinbefore described with reference to and as shown in any of the accompanying drawings.

34. Any novel feature or novel combination of features described herein and/or in the accompanying drawings.

INVESTOR IN PEOPLE

**Application No:** GB 0112884.2 **Examiner:** Joanne Pullen
**Claims searched:** 1-22 **Date of search:** 22 October 2002

# Patents Act 1977
# Search Report under Section 17

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.T): E1D DDV, DDJ, DF146, DF147, DF172.

Int Cl (Ed.7): E04B

Other: Online: EPODOC, WPI, JAPIO.

**Documents considered to be relevant:**

| Category | Identity of document and relevant passage | | Relevant to claims |
|---|---|---|---|
| X | GB 2284836 A | (ULTRAFRAME plc) Figures. | 1 at least |
| A | GB 2287048 A | (ULTRAFRAME plc) | |
| X | GB 2263290 A | (MODERN CONSERVATORY SYSTEMS) Figures and page 3 lines 16-19) | 1 at least |
| A | WO 02/075070 A1 | (R.A. WHITING DESIGN) | |

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| X | Document indicating lack of novelty or inventive step | A | Document indicating technological background and/or state of the art. |
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